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moving its head up and down on the prothorax." The two larvæ which I had, did not reach the last stage of development, so that I had no opportunity to repeat this observation.

In his second annual report on the noxious, etc., insects of Missouri, the late C. V. Riley states that the caterpillar of *Thyreus abbotii* "does not assume the common sphinx attitude of holding up the head, but rests stretched at full length, though if disturbed it will throw its head from side to side, thereby producing a crepitating noise" (p. 79).

So far as I am aware, this is the only other instance known of a lepidopterous larva producing by friction or in any other way an audible sound.

It is probable, however, that there are similar cases on record and I would be much obliged for any information regarding them.

#### NOTE BY THE EDITOR.

The larva of *Cressonia juglandis* is well known to produce a squeaking noise when disturbed, apparently by motions of the head against the prothorax. *Platypteryx arcuata* produces a rasping sound by scraping certain stiff setæ on the surface of the leaf and some Tineids make a rustling noise by motions within their dried leaf mines; but these latter cases are perhaps not of the class of which Dr. Packard desires to learn.

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## REMARKS ON THE CATALOGUE OF THE NOCTUIDÆ IN THE COLLECTION OF THE BRITISH MUSEUM.

BY JOHN B. SMITH, SC.D.,

NEW BRUNSWICK, N. J.

(PLATE IV.)

This is Volume IV of the *Phalænæ* and, like the preceding volumes, is prepared by Sir George F. Hampson. After defining the Noctuidæ the author divides them into 15 subfamilies of unequal value and extent. As this is the first really well based attempt to make a subfamily division the table is reproduced, modified in form only:

1. Maxillary palpi absent .....	2
Maxillary palpi present.....	15

2. Hind wing with vein 5 obsolescent, from or just below middle of discocellulars	3
Hind wing with vein 5 well developed.....	6
3. Mid and hind tibiæ, or hind tibiæ only spined.....	AGROTINÆ.
Mid and hind tibiæ not spined .....	4
4. Eyes hairy.....	HADENINÆ.
Eyes not hairy.....	5
5. Eyes with long overhanging cilia .....	CUCULLIANÆ.
Eyes not ciliated.....	ACRONYCTINÆ.
6. Hind wing with vein 5 more or less approximated to 4 at base.....	7
Hind wing with vein 5 parallel to 4.....	14
7. Frenelum of female simple.....	8
Frenelum of female multiple.....	9
8. Abdomen with lateral anal pencils of hair.....	EUTELIANÆ.
Abdomen without anal pencils of hair ; forewing with tufts of raised scales in cell .....	STICTOPTERINÆ.
9. Retinaculum of male bar-shaped .....	10
Retinaculum of male not bar-shaped.....	11
10. Forewings with tufts of raised scales in cell .....	SARROTHRIPINÆ.
Forewings without tufts of raised scales in cell.....	ACONTIANÆ.
11. Mid tibiæ spined.....	CATOCALINÆ.
Mid tibiæ not spined.....	12
12. Eyes hairy.....	MOVINÆ.
Eyes with long overhanging ciliæ .....	PLUSIANÆ.
Eyes neither hairy nor ciliated.....	13
13. Hind wing with vein 5 from close to lower angle of cell, strong.....	NOCTUINÆ.
Hind wing with vein 5 from well above angle of cell, rather weak.....	ERASTRIANÆ.
14. Hind wing with vein 5 parallel to 4.....	HYPENINÆ.
15. Maxillary palpi present .....	HYBLÆINÆ.

The first point that attracts attention in this table is the departure from the uniform subfamily termination so generally used in American works. That really amounts to a matter of practice only and the substitution of *iinæ* for *ianæ* is easily made by one who prefers it.

Nothing is more variable than the force with which characters appeal to students in the same group and it is quite remarkable how one structure or set of structures may dominate an arrangement to the subordination of others which seem of greater value to another. I am of course quite as one-sided as others and will not pretend to say that Mr. Hampson has given undue importance to any one character. Yet I would not go so far in some directions as he does and I would use other characters.

The Hyblæinæ might properly be raised to family rank and the Euteliiinæ and Stictopteriniæ with the simple frenelum in the female are certainly more sharply separated off than are some of the others.

The basis of the chief division is essentially the old Trifid and Quadrifid classification and in the main it is a good one; but as I have pointed out in the revision of our species of *Acontia*, that genus contains perfect trifids and perfect quadrifids. I am also unable to appreciate the character given for the Hypeninae which I believe occurs equally in some of the Noctuinae.

And this brings us to one of the most unfortunate features of the work from the standpoint of those who agree with the canons of nomenclature which have been adopted by the American Ornithologist's Union; *i. e.*, the subfamily names based on genera used in a sense different from the one heretofore accepted. The term Agrotinae will pass, because *Agrotis* in the old broad sense is the leading genus, but to use Hadeninae for a distinctively hairy-eyed series is misleading to those of us who use *Hadena* as Lederer and Guenée used it and as it is yet used in Staudinger and Rebel's Catalogue. The method of determining a generic type by selecting the first species placed under it by the author no matter what the remainder of the group might be, does not strike me as logical and it ignores the work of a series of students who have pretty generally assumed the privilege of subdividing genera as seemed most natural; retaining the original generic name for a series of the species placed under it by its author.

The term *Noctua* applied to an Erebiid genus is disconcerting to one who has been in the habit of associating it with a typical "owlet" moth.

As to the others, there is no reasonable objection to be made unless it be that *Cucullia* is hardly a sufficiently generalized form to serve as typical of the species with lashed or ciliated eyes.

The first point to attract attention in the division of the Agrotinae is the close association that it brings about between the Agrotids and the Heliothids, and next the separation that it makes from those forms with non-spinose tibiae which we have been in the habit of placing with them. I have not quite convinced myself, as yet, that *Heliaca* and *Melicleptria* are really members of distinct subfamilies and there are others that I am not inclined to remove from their present associations.

The table of genera on pages 7-10 is a work of art and shows, first, that secondary sexual characters like antennal structure are not recognized as of generic value at all and, second, that the tibial arma-

ture is considered as of more importance than the eye vestiture or fringing.

Mr. Hampson speaks from a much broader knowledge than my own, for the collections in his care come from all parts of the world — therefore his opinions should carry weight accordingly ; for myself the study of our own fauna has led me to conclude that all the hairy-eyed genera are descendants of one common stock and that in the Noctuidæ hairy eyes were developed at one point only. The spinose armature of the tibia is so variable and so easily modified that I cannot give it so great a value as the hairy or naked eyes.

As to divisions based on characters found in one sex only, I find them convenient in the breaking up of unwieldy genera, and their use in some other orders is almost universal. As genera are admittedly opinionative — some species being apparently in the same boat — no fault can be found.

The descriptive work begins with what we have considered Heliothid genera, and, regarding only the American forms, *Heliolonche* Grt., heads the list. *Heliophana* Grt., and *Helioseia* Grt., follow as used in our lists ; *Heliothis* Ochs., includes most of the species we call *Melicleptria*. *Melaporphyria* is quite properly restricted to *immortua*, and *Dysocnemis* is used for the other species of my list. *D. borealis* from St. Martin's Falls, Hudson's Bay, is described as new. I have had specimens from Calgary and British Columbia set aside for some time, but when first received, I mistook them for *belladonna*.

*Pyrocleptria* (new genus) *californica* Hamps. is another addition to our fauna from Walsingham's Californian collection. *Pseudotamila* Sm., gets a Chinese addition. *Chloridea* Westw., is made to include *Aspila* Gn., *Heliocheilus* Grt., and *Heliothis* Hbn. I am not at all sure that this is a good combination and regret *Heliothis armiger* could not be retained. The suggestion made in my catalogue that *albidentina* Wlk., and *paradoxa* Grt., are good species is sustained, and Butler's reference of *inflata* Wallgr., is denied, though the latter is nevertheless made a synonym of another of Wallengren's species. Mr. Hampson denies the right of an author to correct a specific name, therefore writes *C. phloxiphaga* G. & R., instead of *phlogophaga* as Mr. Grote corrected it later. *Oxylos* Grt., is retained for *citronellus* G. & R., and *Schinia simplex* Sm., is now the type of *Chlorocleptria* Hamps. *Dasyspoudeæ* Sm., remains undisturbed and so does *Rhodophora* Gn., save that *citronellus* is removed as above noted. *Thyreion*

Sm., gets *Schinia ligea* Sm., as an added species though I am not quite ready to subscribe to the correctness of this reference. *Rhododipsa* Grt., remains unchanged. *Schinia* and *Lygranthæcia* are about as in my recent list; but the addition of *Pippona* is a surprise. The type is in the British Museum and the reference should be correct; but the peculiarities of venation, wing-form and clypeal characters pointed out by me should hold the genus unless, indeed, my specimen was an abnormal one. To *Schinia* comes *Bessula luxa* which I suspected before I saw the type; but have regarded as a good generic form ever since. *Eupanychis* Grt., is recognized for *spinosa* Grt., and *crenilinea* Sm., is added to it. *Melicleptria* Hbn., contains only one American species, *M. scutosa*, and that is American only because Mr. Grote redescribed it as *nuchalis*. *Timora* Wlk., contains forty species with *Rhodosea julia* as the only American member and as it also forms a section by itself, it will not be doing serious violence to classification if it be given generic recognition as separate from its African and Asiatic allies. *Copablepharon* Harv., contains only our own species and the specific names in this genus, only one of which is written as originally described, attract attention to the fact that terminations have been ruthlessly altered in all cases where necessary to a grammatical agreement with the generic name. The tendency with us has been rather in the direction of letting the name stand as originally written whether the ending was right or wrong. *Actinotia* Hbn., contains no American species and our *A. ramosula* and *A. stewarti* are temporarily without a home — the specific names occurring nowhere in the index — or elsewhere so far as I have been able to find. With this genus the real Noctuid series begins, the Heliothid type being fairly ended by *Copablepharon*. *Agrotiphila* Grt., is distinctively Agrotid in type but we get, in addition to the species so placed by me, *Anarta quieta* Hbn., with synonyms *A. schænherri* Zett., *constricta* Wlk., and *rigida* Wlk. If this is correct it means that some of the identifications current in our collections are erroneous. *Orosagrotis* is a new genus based on *Agrotiphila rigida* Sm., with *incognita* and two species from Kashmir to keep it in countenance; but I must confess to a distinct doubt as to the validity of this genus. My great comfort after reading and comparing the descriptions and specimens was that if I went to extremes in some directions, I was no worse than my neighbors who walked in other paths. *Porosagrotis* Sm., is recognized on a basis somewhat different from that originally suggested by

me. *Carneades siccata* is added, perhaps correctly, while as to *Feltia longidens* I wish to register a doubt. *Euxoa* Hbn., is the banner genus of the series, containing no less than 332 species. Nineteen names appear in the generic synonymy, including *Pleonectopoda* Grt., *Carneades* Grt., *Chorizagrotis* Sm., and *Rhizagrotis* Sm., which are based on North American species. It is a question of policy, perhaps, whether so unwieldy a genus should not be divided into subgenera at least, to make recognition of group characters easier.

There has been some change in the synonymy of our species, based upon a closer examination of some of the Walker and Grote types in the British Museum than I was able to make; but in some instances I think the error is Hampson's unless, indeed, the actual types were not before me when I made my notes. At that time the noctuids were yet in large part unarranged and the Grote collection had not been incorporated. There are also a few specimens in the latter collection erroneously named and not the types—which may have added to the confusion. As soon as the work on the more typical noctuids is completed I will try to make another direct comparison and with the assistance of Mr. Hampson, the synonymy of the American species may then be finally settled. In 1900 when I looked over the collection I failed to note any obvious errors, and certainly no such gross blunders as would appear in the mixture of names under *messoria*, *tessellata* and *insulsa* in my catalogue.

*Agrotis dolis* Grt., figures as a synonym of *E. birivia* Hbn., and the locality Colorado is said to be incorrect. This is right, I believe. Two specimens without locality labels, were sent by the late Dr. George D. Hulst to Mr. Grote, as part of a lot of Colorado material. Dr. Hulst stated to me that he found them in a box of specimens purchased from Mr. Morrison and supposed them to be part of the collection made that year. As Dr. Hulst at that time had a collection of European Noctuids and as no additional specimens of *dolis* have since appeared, it seems safe to conclude that an error was made and to omit the species from future lists.

My *Carneades incubita* is cited as a synonym of *Euxoa septentrionalis* Wlk., which I had referred as a synonym of *messoria*. This is quite likely correct, because it was not until 1900 that I recognized the distinctness of the forms theretofore lumped under *messoria*. Under *E. messoria*, *insulsa* Wlk., and *expulsa* Wlk., appear as synonyms and this I can scarcely believe correct. *Messoria* and *insulsa*

as I have them are so very different that it seems incredible that I could have confused them no matter how bad the specimens. *Agrotis cogitans* is made a synonym of *Euxoa choris* Harv., which I am not ready to believe is right. I have a good colored figure of type *choris* made a dozen years ago, and Hampson's figure is at least fair — *cogitans* is not like either. *Agrotis pleuritica* Grt., is cited as a synonym to *insignata* Wlk., and this again puzzles me, for as I remember them there was no resemblance between the two. *Euxoa decolor* Morr., obtains specific rank with *campestris* Grt., as a synonym, all the Walker names being referred elsewhere. *Euxoa tessellata* Harr., gets *perlentans* Wlk., *insignata* Wlk., *illata* Wlk., *subsignata* Wlk., and *declarata* Wlk., as synonyms. *E. verticalis* Grt., is made a good species — properly I think; but my *spectanda*, which appears as a synonym is also good and not at all like the species to which it is referred. *Euxoa auxiliaris* Grt., has *introferens* Grt., and *soror* Sm., as synonyms — incorrectly I am sure. *Soror* is certainly different and I believe that *introferens* is equally good. This whole series of species is very common and I have long suites in the collection. When the sexes are separated distinction is easy, for the females of the one resemble the males of the other more than they do their own mates. *Agrotis cloanthoides* Grt., is placed as a synonym to *Euxoa albalis* Grt., and so I believed them to be until recent good material makes it certain that they are really distinct. On the whole, where we have over 200 of the species of this genus in our fauna, there has been surprisingly little change.

*Feltia* Wlk., receives one of my species of *Porosagrotis* and the synonymy is not quite in accord with my list. *Subgothica* Haw., is made the same as *jaculifera* Gn. = *tricolor* Lint., and on this point I think the author is in error. Slingerland demonstrated the identity of Haworth's species very fairly, it seems to me. *F. ducens* Wlk., is used for the species we have been calling *subgothica*. *Agrotis* Ochs., is used for the species in my list; *opacifrons* is added to the third section and then come all the species separately listed by me as *Noctua*. *N. smithii* Snell., is not recognized as different from *baja* Fabr., yet there is certainly a difference in the tibial spinulation between the European and American examples. Just how far this may be a variable feature is not yet determined; but in view of the value assigned to it in generic separation, it seems odd that it should not be, in this case, considered as even of specific value. *N. hospitalis* Grt., is cited



as a synonym to *brunnea* Schiff., and perhaps correctly; the species is so rare that in all my experience I have seen less than half a dozen examples. *Eriensis* is made a synonym of *jucunda* instead of *phyllophora* which may be correct, though I am not ready to accept the reference until I can see the example again myself.

Our familiar *A. clandestina* Harris, will have to sink in favor of *unicolor* Wlk., which no doubt has priority. The dates are correctly given in my catalogue; but I hated to give up one of the Harris names and therefore compromised by stating the facts and failing to act up to them. Just why Dr. Dyar followed me in this lapse from strict synonymical integrity he must himself explain.

*Agrotis unimacula* Morr., replaces *A. haruspica* Grt., and thereby a very interesting question is raised. Staudinger described an *Agrotis unimacula* in 1859, and in his catalogue of 1871 refers it, questionably, as a variety of *plecta*; and so it yet stands in the edition of 1901. In 1874, Mr. Morrison also described an *Agrotis unimacula*, and Mr. Grote in 1875 pointed out this duplication, suggesting *haruspica* to replace it. Mr. Hampson now writes *unimacula* Stgr., a synonym of *plecta* and restores *unimacula* Morr. Has he a right to do this; his own opinion as to the status of Staudinger's species being the only thing that gives vitality to his action? Does not the same principle that "once a synonym, always a synonym" govern here as well? Personally I shall continue to write *haruspica* Grt., though not for exactly the same reasons that influenced me in writing *clandestina* Harris.

*Metalepsis cornuta* Grt., still stands alone; but in *Eucoptocnemis* a South American species is added and two species are recognized in our fauna: *fimbriaris* Gn., with *obvia* Wlk., as a synonym, and *tripars* Wlk., with *worthingtoni* Grt. as a synonym. The generic association is undoubtedly correct and the only point on which I am yet in doubt is, whether we really have two species; no two of my examples are alike!

*Onychagrotis* is a new genus proposed for *Agrotis rileyana* and correctly so; we have another species that will, I think, prove referable to it.

*Pseudorthosia* Grt., is properly placed here and its near generic ally *Choephora* finds a place, incorrectly I think, as a synonym of *Episilia* Hbn., which in turn replaces *Pachnobia* Gn., as I have used that term. *Agrotis bollii* Grt., is placed here as *hilaris* Grt., and this

is a surprise in several ways. The insect does not at all agree with the other *Pachnobia* of our fauna in general appearance or habitus and is altogether out of the faunal range of the genus. Furthermore, *hilaris* was preoccupied in *Agrotis* when described and was therefore a bad name. Mr. Grote himself recognized this and changed the term to *bollii*. As matters then stood the change was correctly and necessarily made and subsequent changes in classification should not be allowed to invalidate a course which was proper when taken. My *Setagrotis terrifica* also finds a place in this composite genus which thereby becomes ever more interesting.

I have not noted, heretofore, that Mr. Hampson rarely recognizes either a W or a K in a specific name — it is almost always a V or a C. Now this is of course entirely right from the view-point of the philologist so far as the W is concerned; but why ignore the K, which does have a right to exist? In some cases the change causes a momentary puzzle, as when *okakensis* is written *ocacensis*; but the effect is positively startling when we read *voccei* and are expected to recognize *wockei* in that disguise. Wocke is not good Latin, perhaps; but since the practice of naming species after individuals has been recognized, it would seem as though a Latin termination only might be considered sufficient. The same is true when a name is taken from a locality where the language used has no Latin source or where, as in America, Indian tribal or other names are sometimes employed. Changes like those cited make a name irrerecognizable without an explanation attached.

*Agrotis rava* H. S., is made a synonym of *A. quadrangula* Zett., all under *Episilia*, and this is probably correct.

*Lycophotia* Hbn., as used by Hampson includes among others, *Peridroma* Hbn., *Setagrotis* Sm., *Agrotis scandens*, and many of the species I call *Noctua*; so there is also quite a range, generic and specific under this term. Haworth's name *margaritosa* replaces *saucia*, though the former is undoubtedly the less usual form of the species. *L. infecta* Ochs., replaces our *Peridroma incivis* Gn., perhaps correctly. I did not feel at all sure on this point in 1893, and such South American forms as I have seen, do certainly indicate two species. *Adita chinanthi* A. & S., remains solitary. My genus *Platagrotis* is replaced by *Aplectoides* Butler, a generic term that I had overlooked, and only our American species belong to it. So *Ufeus* remains as in our lists. *Hadena evelina* French, is placed in *Anytus*, erroneously I think; but

then Hampson did not know of the relationship between *Fishia* and *Aporophila*, nor of the species recently described by me. The reference to *Anytus* is certainly better than that to *Hadena*. *Anomogyna* Stgr., receives our species *infimatis* and *vernilis*, which may be correct, for they do offer differences from the other species that I referred to *Setagrotis*. As to *Platagrotis sincera* I am more sceptical. *Richia* Grt., is used as in my recent list and *Trichorthosia* also stands as before. *Mythimna* Ochs., includes the species of *Pseudoglyza* Grt., *Mesogona oxalina* Hbn., to which *intexta* Harv., is cited as a synonym and also the species referred by me to *Semophora* Steph. It is of course a question of generic division and I would hold the two series apart. As to the terms to be used, that will be dependent upon a verification of the types of the genera under the rules of the Ornithologist's Union. *Triphæna* Hbn., is made to include my *Abagrotis erratica* which forms a section by itself as against thirty or more other species; a pretty fair indication, I think, that my genus is a good one. Though *Rhynchagrotis* is not cited as a synonym of *Triphæna* yet all the species I placed in it, save one, now find a home in the latter genus. I am not quite ready to agree that our American species, which form all save three of the series with dusky hind wings are really congeneric with the five species in which the hind wings are orange and one of which, *interjecta*, is the type of *Triphæna*. *Rhynchagrotis* Sm., is restricted to *gilvipennis* Grt., and *chardynyi* Bdv., which I am pleased to see apart. The interesting feature in this arrangement is that when I first used *Rhynchagrotis* I was considerably in doubt whether *gilvipennis* was really referable to it and I suggested it as a distinct generic type. To find my genus now depending on this species is certainly an unexpected outcome. *Pronoctua* contains only the two American species while *Eueretagrotis* gets two Asiatic additions. *Protagrotis* is a new genus proposed for *Agrotis viralis* Grt., which I believed and yet believe to be a synonym of *Luperina passer* Gn. It finds its place in the Agrotids because it has one spine between the middle and terminal spurs of the hind tibia.

This ends the regular series; but the "addenda and corrigenda" make some changes. *Chloridea armigera* which was at least partly recognizable is changed to *C. obsoleta* Fabr., as which we will have to recognize it in future. *Apharetra* Grt., heretofore treated as an Acronyctid is found to have spinose mid and hind tibiæ and to belong near to *Anytus* rather than to the customary position.

The list of unrecognized species is remarkably small and it contains some names of species which were described by me since I sent my contributions to Mr. Hampson. It will be my pleasure to add to the British Museum series in this direction.

Altogether the book is an excellent one. I have been very free in expressing dissent on some points, but that makes nothing against its general value. So far as the generic differences go, these are so largely matters of personal opinion that a dissent from a conclusion is not necessarily even a criticism. On the question of identity of species and consequent synonymy there has been little disagreement between Mr. Hampson and myself and some day we will reach a final agreement on all points. Criticism in the nature of fault-finding or in the expression of dissent is easy; but it is not so easy to present a substitute that is more satisfactory, even to oneself. Without recasting the entire scheme it is almost impossible to avoid using exactly the characters employed by Mr. Hampson. The following table illustrates that point.

## NOCTUIDÆA.

- |  |                |
|--|----------------|
| 1. Maxillary palpi present.....  | HYBLÆIDÆ.      |
| Maxillary palpi wanting.....   | 2.             |
| 2. Frenelum in the female simple.....  | 3.             |
| Frenelum in the female compound.....   | 4.             |
| 3. Abdomen with lateral anal pencils of hair.....  | EUTELIDÆ.      |
| Abdomen without anal pencils of hair, primaries with tufts of raised scales in the cell.....                             | STICTOPTERIDÆ. |
| 4. Secondaries with vein 5 weak or obsolescent, from the cross-vein well removed from 4.....                             | 10.            |
| Secondaries with vein 5 moderate or strong, from the cross-vein near to vein 4.....                                      | 7.             |
| Secondaries with vein 5 as strong as the others, close to 4 and forming part of the series of the end of the median..... | 5.             |
| Secondaries with vein 5 as strong as the others, out of the median at or before the division into 3 and 4.....           | HYPENIDÆ.      |
| 5. Eyes hairy.....   | PANTHEIDÆ.     |
| Eyes naked.....  | 6.             |
| 6. Median cell of secondaries very short, veins 2-5 originating close together.  |                |
|  | EREBEINÆ.      |
| Median cell of secondaries extends to middle of wing at least, veins 2-5 are not close together at base.....             | CATOCALINÆ.    |
| 7. Retinaculum of the male bar-shaped.....   | 8.             |
| Retinaculum of the male not bar-shaped.....  | 9.             |
| 8. Forewings with tufts of raised scales in the cell.....  | SARROTHRIPINÆ. |
| Forewings without such tufts.....  | ACONTINÆ.      |
| 9. Eyes more or less fringed or lashed..   | PLUSIINÆ.      |

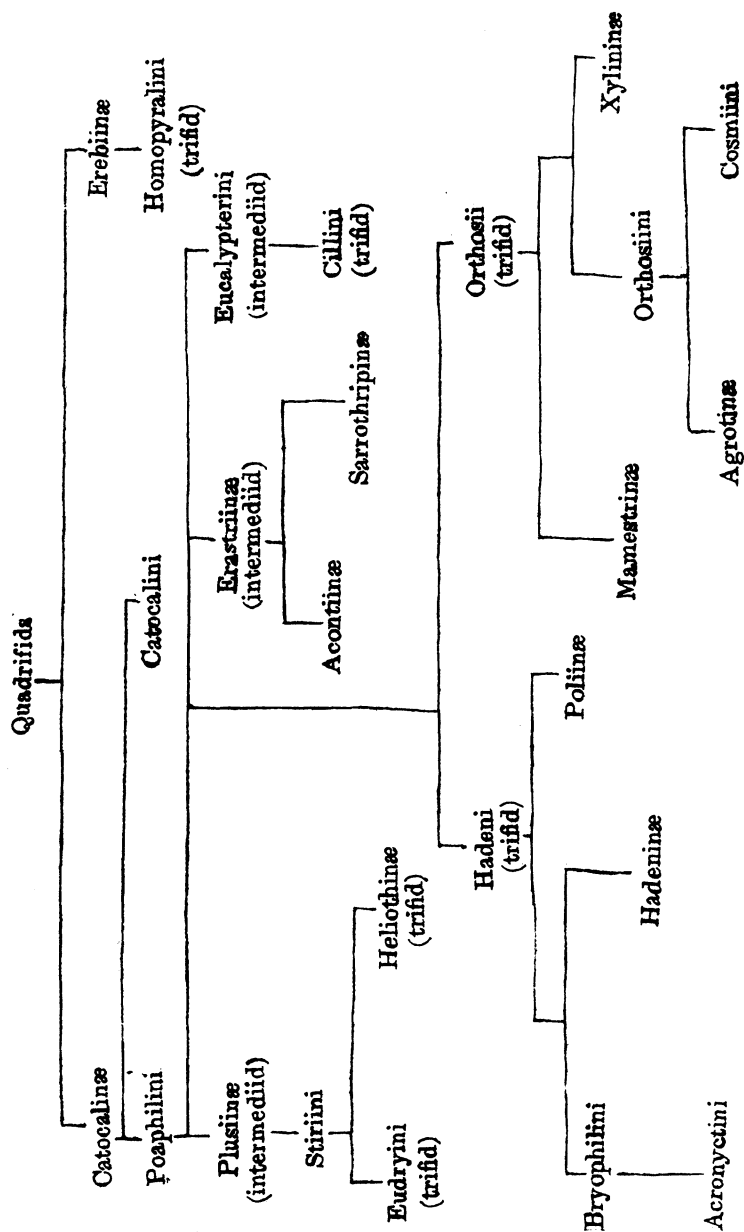
- Eyes not so fringed or lashed.... ERASTRINÆ.
10. Eyes hairy..... MAMESTRINÆ.
- Eyes naked, with overhanging lashes or ciliæ..... 11.
- Eyes naked, without overhanging lashes or ciliæ..... 12.
11. Primaries subparallel or lanceolate, maculation usually strigate or tending to it ; body usually depressed.....XYLININÆ.
- Primaries trigonate, maculation of the usual type, rarely strigate ; body not depressed.....POLJINÆ.
12. Tibiæ not spinose..... 13.
- Some or all the tibiæ spinose..... 14.
13. Colors rarely contrasting, normal maculation usually present ; fore tibia rarely armed ; front of head not modified ; eyes round.....HADENINÆ.
- Colors usually contrasting ; fore tibia often armed ; front of head often modified ; eyes tending to reniform..... HELIOTHINÆ.
14. Colors bright ; vestiture long fine hair or broad glossy scales ; eyes often reniform ; fore tibia tends to become abbreviated and armature to consist of stout long claws..... HELIOTHINÆ.
- Colors rarely contrasting, vestiture usually a mixture of scale and hair or flattened hair ; eyes rarely reniform ; fore tibia of normal length, armature usually spinose, not claw-like in character.....AGROTINÆ.

The table is unsatisfactory, because it does not express the relation of the subfamilies to each other. Development has been from the Quadrifids, through the Intermediids, in which vein 5 retained its connection with the median though well removed from 4, to the Trifids where 5 is always from the cross-vein and its direct connection with the median is lost. But this development has been along several lines and, while a certain similarity in structure resulted, this does not indicate real relationship. For instance I see very little connection between the Heliothid series and the Agrotids, though they certainly agree in having spinose tibiæ and naked eyes. But the tibial armature is not the same, especially on the forelegs and the character of the frontal modifications is not the same. Even the vestiture differs and the head and mouth appearances have not the same character.

I can better show in a graphic form my view of the varying lines of development that have given us our present Noctuid fauna. The scheme is subject to change, however, and the terminations employed are not uniform because the divisions themselves are far from being equal in value.

#### EXPLANATION OF PLATE IV.

A graphic representation of the phylogeny of the groups of the family Noctuidæ, represented as derived from a hypothetical quadrifid ancestor. The groups called Hyblæidæ, Euteliidæ, Stictopteridæ, Hypenidæ, Pantheidæ and Erebeinæ are not included.



Phylogeny of Noctuid Groups.